DOING RESEARCH RIGHT

David Knauft
Horticulture Department
Graduate School

WHAT IS 'RIGHT RESEARCH'?

- The word comes from the French, chercher/rechercher which translates 'to search,' 'to look for,' 'to investigate,' 'to discover'
- One of the most fundamental differences between undergraduate and graduate education is that, as a graduate student, you have the opportunity, responsibility, and requirement through your research to create new knowledge
- "Right research' means that we do everything we can to insure excellent quality in what we discover and report

THE QUALITY OF OUR RESEARCH IS TRUSTED BY THE GENERAL PUBLIC

- Pew survey indicated 84% of Americans perceive that scientists add value to our society (and 10% didn't know)
- Contribute 'a lot' to society's well-being, scientists are third behind military and teachers (and above doctors and clergy)
- Bottom line is that you must be able to say with absolute confidence "This is new information that I have discovered. I know it is true."
- Two main issues – is it really true? If so, how is this truth communicated?

IS IT TRUE?

- Two gatekeepers of research truth – academia and professional organizations
- Your advisory committee is largely responsible for oversight on the truth of your thesis/dissertation
- Your professional society is largely responsible for the peer evaluation of publications, and the larger community is responsible for peer evaluation of grant proposals
- The U.S. Government has an Office of Research Integrity that overseas responsible conduct of research (RCR), primarily to insure that all findings from federally funded research are true
- Those institutions and individuals receiving federal funding must abide by these conduct guidelines
- Increasingly also must demonstrate that people receiving money have had training and understand the nature of RCR

UGA AND RCR

- All UGA employees, including grad assistants, must abide by the university's policy on responsible conduct in research
- Basics are that researchers should never:
  - Falsify data
  - Fabricate data
  - Plagiarize

'RIGHT RESEARCH' IS BROADER

- Collection, use, and interpretation of research data
- Methods for reporting and reviewing research plans or findings
- Relationships among researchers with one another
- Relationships between researchers and those that either fund or will be affected by their research
- Conflicts of interest
- Means for responding to misunderstandings, disputes, or misconduct
- Options for promoting ethical conduct in research

What if the research you share isn't true?

- May publish false data that causes harm
- May lose your job
- May lose your funding
- May lose your reputation
- May ruin other's job
- May impact your institution

Falsifying data

- Often a matter of interpretation
- Outlying data
- How do you decide whether to include or eliminate?

DATA MANAGEMENT

- A graduate student prepared for her thesis a table showing that a toxic substance inhibits an enzyme's activity by about 20%. She has done 6 experiments. The mentor looked at the data and found that one of the data points showed a stimulation of 20% and that this point is one that skewed the results to a low level of inhibition with a large standard of deviation. The mentor further determined with the student that the outlier is outside the mean by 2.1 times the standard deviation and that it is reasonable not to include it with the rest of the data. This would make the inhibition about 30% and thus make the potential paper more in line with other research results and hence more "respectable." The mentor instructed the student to do so.
- From Shamoo and Resnick, Responsible Conduct of Research p. 64, 2009

FABRICATING DATA

- Much more clear cut
- Dreaming up information that hasn't been generated by research or observation
- What would cause people to do this?
- What are the consequences?

Plagiarism

- Failure to give someone else credit for their work
- Can be very blatant
- Can be subtle
- General rule if you use more than 3-5 words verbatim from someone else, put in quotes and reference
- Sometimes can rework a word or two
- Then is it plagiarism?
- What about reworking or borrowing your own words?

Failure to give someone else credit

- Plagiarism can also include issues of authorship
- Who should be an author on a paper?
- **Criteria vary, but in general an author should:**
- Have made a significant intellectual contribution to the paper
- Be prepared to defend and explain the paper
- Have read and reviewed the paper
- Author order is important
- Discuss up front and early in the research

OTHER CRITICAL ISSUES

- Protection of human and animal subjects
- In the past, human and animal rights were diminished or ignored because the search for knowledge was deemed more important
- This has changed significantly
- Prior to doing any research with humans, need to contact UGA Institutional Review Board, have training, and submit protocol for approval
- ANY research with humans should be approved, even surveys
- What our society considers acceptable types of animal research depend to some extent on our human perception of the value of the animal
- What we do with fruit flies differs significantly from what we do with primates

HUMAN SUBJECTS

- Jim's project involves a subset of several hundred samples from the obesity study. One day, Renee, one of the other graduate students in the lab, approaches Jim and starts asking questions about the samples he's working with. She explains that for her work on sickle-cell anemia and mutations in a hemoglobin gene in African-Americans she needs 50 ethnically matched control samples. Since Jim has access to such a large collection of samples, Renee asks if she can take small aliquots of some of his samples from the obesity study. She tells Jim that she will not be looking at disease in these patients and is not really doing a "study" on them. She just needs them as controls, and she doesn't even need that much DNA.
- http://ori.dhhs.gov/education/products/columbia_wbt/rcr_data/annotatedcase/index.html#1

WHO OWNS DATA?

- All data and materials created while at UGA belong to UGA, not you or your major professor
- There can be some variation on this, depending on sources of funding for the research
- Some funding includes clauses for ownership of results
- What happens when you leave?

DATA OWNERSHIP

- Susan Banks has finished her dissertation. She is going to a faculty position at another university. Before leaving for her job, she goes to her major professor's office to make copies of research data stored only on Hayward's computer using special software, which she also plans to copy. She is eager to pick up where she left off with two projects she worked on earlier. Hayward comes in as Banks is downloading her material, and asks her what she is doing. She tells him, and he then says to her that she cannot take the data. "They belong to me," he says. Banks is confused. "But I did the work. I can't follow up on it without the data." Hayward is adamant. "I'm sorry, but our research project was a joint enterprise, and all the work you did was funded by money I brought in via grants. The data actually belong to the university, and the work will be continued with other students." Banks, seeing her plans fall apart around her, protests, but Hayward is implacable.
- A colleague tells Banks she has been mistreated and should go into the office on the weekend and copy the data.
- http://ori.dhhs.gov/education/products/columbia_wbt/rcr_data/case/index.html

DOING RESEARCH RIGHT

- Proper design, data collection, interpretation, and management
- Appropriate acknowledgement of those who contributed to your research
- Ethical standards when working with animals or humans
- Avoiding conflicts of interest
- dknauft@uga.edu